

REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-22 are pending in the present application with Claims 1, 5-7, 10-12, 16-18, 21 and 22 having been amended by the present amendment.

In the outstanding Office Action, Claims 1-22 were rejected under 35 U.S.C. § 112, second paragraph.

Applicants note consideration of the IDS filed March 22, 2001, has not been acknowledged. Copies of this IDS including the PTO Form 1449 is attached. Accordingly, it is respectfully requested this IDS be acknowledged.

Regarding the rejection of Claims 1-22 under 35 U.S.C. § 112, second paragraph, the outstanding Office Action indicates Claims 1-22 are indefinite because they are referring to a first semiconductor layer with a plurality of first conductive type semiconductor regions formed on a surface of the semiconductor layer where the second conductive type layer surrounds a first semiconductor region with portions of the semiconductor layer therebetween, and indicates it is unclear how the structure of the light-receiving device will be formed when the second conductive type semiconductor region is formed on the surface of the first semiconductor layer and surrounding the plurality of first semiconductor regions that are formed in the first semiconductor layer.

The claims have been amended in light of this comment and to more clearly recite the features of the present invention. For example, Claim 1 has been amended to recite that the plurality of first conductive type semiconductor regions are formed in the first semiconductor layer so as to reach the semiconductor substrate from a surface of the semiconductor layer in which the plurality of first conductive type semiconductor regions are formed apart from each other. Further, Claim 1 has been amended to recite that the second conductive type

semiconductor region is selectively formed in a surface region of the first semiconductor layer in which the second conductive type semiconductor region surrounds each of the plurality of first conductive type semiconductor regions with a surface portion of the first semiconductor layer therebetween. As noted in the previous response, these features are shown in Figure 2E, for example.

Further, it is respectfully submitted one skilled in the art would be able to ascertain the scope of the claims in light of the specification, and thus 35 U.S.C. § 112, second paragraph is satisfied.

Accordingly, it is respectfully requested this rejection be withdrawn.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599
David A. Bilodeau
Registration No. 42,325



22850

Tel.: (703) 413-3000
Fax: (703) 413-2220
GJM/DAB/cja
I:\atty\DAB\204404US-am.doc

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IN THE CLAIMS

--1. (Twice Amended) A semiconductor light-receiving device comprising:

a first conductive type semiconductor substrate having a first surface on a light-receiving side and a second surface on the opposite side to said first surface;

a first semiconductor layer formed on said first surface of said semiconductor substrate;

a plurality of first conductive type semiconductor regions formed in said first semiconductor layer so as to reach [reaching] said semiconductor substrate from a surface of said first semiconductor layer, said plurality of first conductive type semiconductor regions being formed apart from each other;

a second conductive type semiconductor region selectively formed in a surface region of [on the surface of] said first semiconductor layer, said second conductive type semiconductor region surrounding each of said plurality of first conductive type semiconductor regions with a surface portion of said first semiconductor layer therebetween;

a first electrode formed on said second conductive type semiconductor region; and

a second electrode formed on said second surface of said semiconductor substrate;

said surface portion of said first semiconductor layer between each of said plurality of first conductive type semiconductor regions and said second conductive type semiconductor region having a higher resistance than resistances of said plurality of first conductive type semiconductor regions and said second conductive type semiconductor region.

5. (Twice Amended) The semiconductor light-receiving device according to claim 1, wherein each of said plurality of first conductive type semiconductor regions has an island form or a stripe form.

6. (Twice Amended) The semiconductor light-receiving device according to claim 1, wherein the surface portion of said first semiconductor layer between said second conductive type semiconductor region and each of said plurality of first conductive type semiconductor layers is completely depleted in a state in which a reverse bias is applied between said first electrode and said second electrode.

7. (Twice Amended) A semiconductor light-receiving device comprising:
a first conductive type semiconductor substrate having a first surface on a light-receiving side and a second surface on the opposite side to said first surface;
a first semiconductor layer formed on said first surface of said semiconductor substrate;

a plurality of first conductive type semiconductor regions [reaching] formed in said first semiconductor layer so as to reach said semiconductor substrate from a surface of said first semiconductor layer, said plurality of first conductive type semiconductor regions being formed apart from each other;

a second conductive type semiconductor region selectively formed in a surface region of [on the surface of] said first semiconductor layer and having a plurality of openings, each of said plurality of first conductive type semiconductor regions being provided within each of said plurality of openings of said second conductive type semiconductor region respectively with a surface portion of said first semiconductor layer therebetween;

a first electrode formed on said second conductive type semiconductor region; and
a second electrode formed on said second surface of said semiconductor substrate;

said surface portion of said first semiconductor layer between each of said plurality of first conductive type semiconductor regions and said second conductive type semiconductor region has a higher resistance than resistances of said plurality of first conductive type semiconductor regions and said second conductive type semiconductor region.

10. (Twice Amended) The semiconductor light-receiving device according to claim 7, wherein each of said plurality of first conductive type semiconductor regions has an island form or a stripe form.

11. (Twice Amended) The semiconductor light-receiving device according to claim 7, wherein the surface portion of said first semiconductor layer between said second conductive type semiconductor region and each of said plurality of first conductive type semiconductor regions is completely depleted in a state in which a reverse bias is applied between said first electrode and said second electrode.

12. (Twice Amended) A semiconductor light-receiving device comprising:
a first conductive type semiconductor substrate having a first surface on a light-receiving side and a second surface on the opposite side to said first surface, said first surface including a plurality of protruded surface portions separated from each other;

a first semiconductor layer selectively formed on said first surface of said semiconductor substrate, said first semiconductor layer having a higher resistance than a resistance of said semiconductor substrate and having a plurality of openings, each of said plurality of protruded surface portions of said first surface being [exposed] positioned within each of said plurality of openings of said first semiconductor layer respectively;

a second conductive type semiconductor region selectively formed in a surface region of [on a surface of] said first semiconductor layer and surrounding each of said plurality of protruded surface portions of said first surface with a surface portion of said first semiconductor layer therebetween;

a first electrode formed on said second conductive type semiconductor region; and
a second electrode formed on said second surface of said semiconductor substrate.

16. (Amended) The semiconductor light-receiving device according to claim 12, wherein each of said plurality of protruded surface portions of said semiconductor substrate has an island form or a stripe form.

17. (Twice Amended) The semiconductor light-receiving device according to claim 12, wherein said surface portion of said first semiconductor layer between said second conductive type region semiconductor layer and each of said plurality of protruded surface portions of said semiconductor substrate is completely depleted in a state in which a reverse bias is applied between said first electrode and said second electrode.

18. (Amended) A semiconductor light-receiving device comprising:

a first conductive type semiconductor substrate having a first surface on a light-receiving side and a second surface on the opposite side to said first surface, said first surface including a plurality of protruded surface portions separated from each other;

a first semiconductor layer selectively formed on said first surface of said semiconductor substrate, said first semiconductor layer having a higher resistance than a resistance of said semiconductor substrate and having a plurality of openings, each of said plurality of protruded surface portions of said first surface being [exposed] positioned within each of said plurality of openings of said first semiconductor layer respectively;

a second conductive type semiconductor region selectively formed in a surface region of [on a surface of] said first semiconductor layer and having a plurality of openings, each of said plurality of protruded surface portions of said first surface being provided within each of said plurality of openings of said second conductive type semiconductor region respectively with a surface portion of said first semiconductor layer therebetween;

a first electrode formed on said second conductive type semiconductor region; and

a second electrode formed on said second surface of said semiconductor substrate.

21. (Amended) The semiconductor light-receiving device according to claim 18, wherein each of said plurality of protruded surface portions of said semiconductor substrate has an island form or a stripe form.

22. (Twice Amended) The semiconductor light-receiving device according to claim 18, wherein said surface portion of said first semiconductor layer between said second conductive type semiconductor region and each of said plurality of protruded surface portions of said semiconductor substrate is completely depleted in a state in which a reverse bias is applied between said first electrode and said second electrode.--